

Apparatus and methods are provided for interacting light with particles, including but not limited to biological matter such as cells, in unique and highly useful ways. Optophoresis consists of subjecting particles to various optical forces, especially optical gradient forces, and more particularly moving optical gradient forces, so as to obtain useful results. In biology, this technology represents a practical approach to probing the inner workings of a living cell, preferably without any dyes, labels or other markers. In one aspect, a method is provided for analysis or separation of a plurality of particles by selecting a wavelength for illumination based upon an analysis of absorption spectra, illuminating the particles with the selected wavelength, considering response of particles to multiple wavelengths, selecting wavelengths based on one or more desired parameters, and illuminating the population to obtain optimized differential motion.